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24-Hour Conversion Kit for the Davis Instruments 7747 Daytime Fan-Aspirated Radiation Shield

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Introduction

Thank you for your purchase of the 24-hour conversion kit used to convert a Davis 7747 Daytime Fan-Aspirated Radiation Shield (DFARS) into a 24-hour unit. This conversion kit is designed to bring your DFARS as close as possible to the official 24-hour shield used on the Davis Vantage Pro2 Models 6153 & 6163. The kit utilizes the same parts used in these models to provide both solar and battery power to your DFARS. This guide assumes you have already purchased and installed the Davis 7747 unit. Scaled Instruments is not responsible for any

change in warranty status of your equipment due to the installation of this conversion kit. Additionally, Scaled Instruments is not responsible for any damage or injury you may cause by installing this kit.

A portion of this installation requires the ability to solder leads to a printed circuit board assembly (PCBA). If you are not confident in your ability to perform this step, it is strongly suggested you contact a friend with the proper equipment and experience to create a good solder joint.

Acknowledgements

Scaled instruments would like to thank a generous customer who wishes to remain anonymous for this outstanding guide.

Components

Before starting, please ensure you have all the necessary components for the conversion. This conversion relies on re-using parts that are already included with your DFARS, so be sure you don't throw anything out until the conversion is complete. You should have the following components shown on the next page:

Parts List

<u>Quantity</u>	<u>Description</u>
(2)	7011.010 24 Hr Spars ISS NiCad Rechargeable Batteries
(2)	7342.509 Pro2 Spars 24 Hr NiCad Battery Cover
(2)	7354.003 Pro2 Spars 24 Hr NiCad Battery Cover O-Ring
(3)	7350.787 PRO2 Standoff M/F #8-32 1.5" Hex 2.25"
(3)	7350.015 PRO2 Stainless Steel 24Hr Shield Spacer
(3)	#8-32 x 1.25" Stainless Steel Machine Screws
(3)	#8 Stainless Steel Lock Washers
(3)	#8 Stainless Steel Flat Washers
(1)	7353.2034 Pro2 SPARS Red and Black Battery Lead Wire Set
(1)	7315.053A Pro2 24hr SPARS PCBA Circuit
(1)	7342.514 Pro2 PCBA Cover
(1)	7345.119 Pro2 24hr SPARS Solar Panel
(6)	#4-3/8" Stainless Steel Self Tapping Screws

Tools Needed:

- A medium Phillips Head screwdriver
- A good soldering iron (Capable of reaching 800 deg F) and StayBrite or equivalent SILVER solder (Do not use Lead-Tin solder due to exposure to elements) – Rosin core preferred, or non-corrosive flux
- Wire stripper

Performing the Conversion

Installation Overview

1. For Consoles – Put the console into Setup Mode to prevent erroneous data while working on the ISS. To put the Vantage Pro2 console into Setup Mode, press and hold DONE and then press the down arrow (-). This prevents the reception of erroneous data while you are removing the DFARS from the ISS.
2. Remove the existing DFARS from the ISS
3. Disassemble the existing DFARS to perform the conversion
4. Install the new components into your DFARS
5. Solder battery wires to the PCBA
6. Reassemble the converted DFARS
7. Test the functionality of the fan with both battery and solar operation
8. Reinstall the radiation shield
9. Take the console out of Setup Mode

Remove & Disassemble the existing DFARS

It is important that you work on the conversion in a safe location, such as a workbench. To do so, please perform the following steps after ensuring your console is in Setup Mode:

1. Locate the Sensor Interface Module (SIM) housing cover on the side of the ISS and open it. This should be the cover that was used with your DFARS and has two solar panels on it.

2. Disconnect the Solar Panel wire on the SIM cover from the SIM board by pulling the Solar Panel connector. **(Fig. 1)**



Figure 1

3. Disconnect the 2nd Solar Panel wire on the SIM cover from the power lead connected to the DFARS fan. Set the SIM cover aside in a safe place. **(Fig. 2)**



Figure 2

4. Remove the foam insert from the cable access port and set it aside. **(Fig. 3)**



Figure 3

5. Disconnect the existing cables from sensor connectors. These cables should all be labeled – if your labels have fallen off, take note of which cables plug in where. **(Fig. 4)**



Figure 4

6. For wired models, disconnect the console cable from the SIM. (**Fig. 5**)

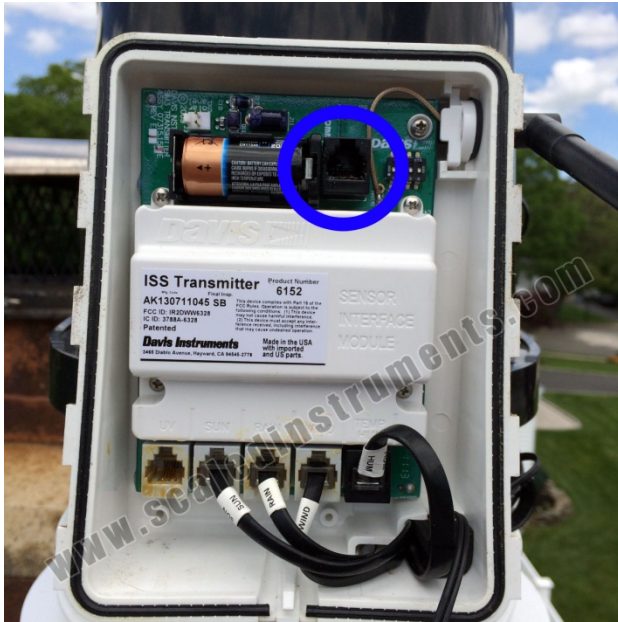


Figure 5

7. Feed the TEMP/HUM cable and the fan power cable through the back of the cable access port. (**Fig. 6**)

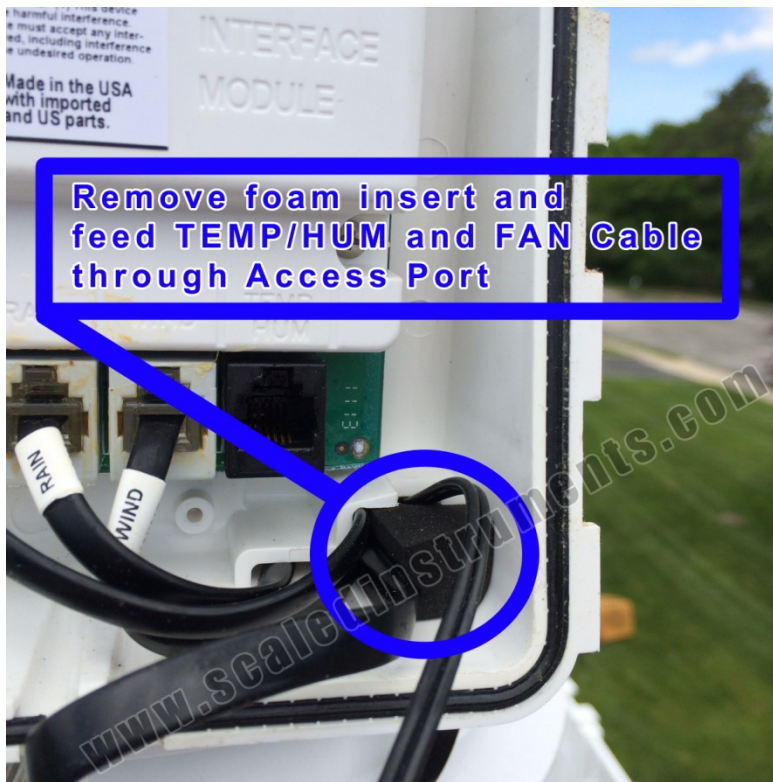


Figure 6

8. Remove the rain collector cone by rotating the cone counter-clockwise until the cone's latches line up with the openings in the base. Lift off the rain collector cone and set aside in a safe place. (**Fig. 7**)

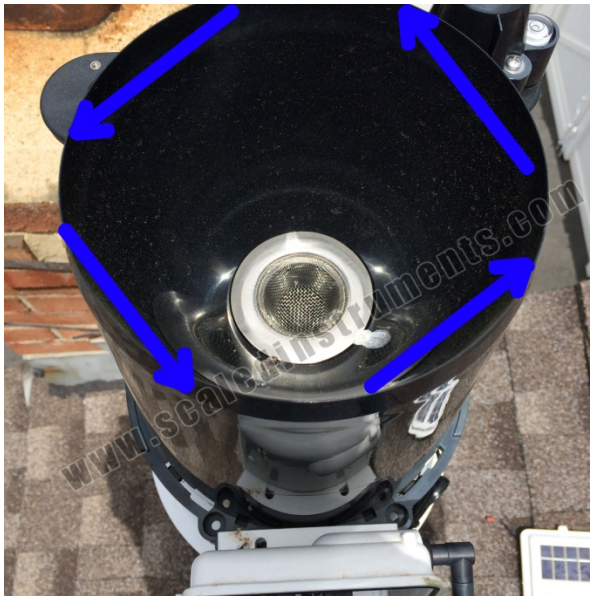


Figure 7

9. While supporting the bottom of the DFARS, remove the (3) #8-32 x 3-1/4" screws, lock washers and flat washers from the ISS base. **IMPORTANT: Be sure to support the bottom of the shield while removing the hardware.** Save this hardware – it will be used later. (**Fig. 8**)



Figure 8

10. The DFARS should now be free of the ISS. **Be careful – there is nothing holding the closed cap plate and open cap plate at the top of the shield at this point.** Take the DFARS to your work area to perform the conversion.
11. Remove the closed cap plate and the open cap plate from the DFARS assembly. They should just lift off. You should now be presented with the Fan Plate. **(Fig. 9)**



Figure 9

Move Spacers

1. Remove the screw that holds the strain relief for the fan power cable and temperature/humidity sensor. Remove the fan power cable from the strain relief and disconnect from the fan. This cable will no longer be needed. Additionally, remove the (3) 4" screws from the fan plate as indicated below. Save the 4" screws, washers, and lock washers from this step, as well as the strain relief and its washer/screw. **(Fig. 10)**.

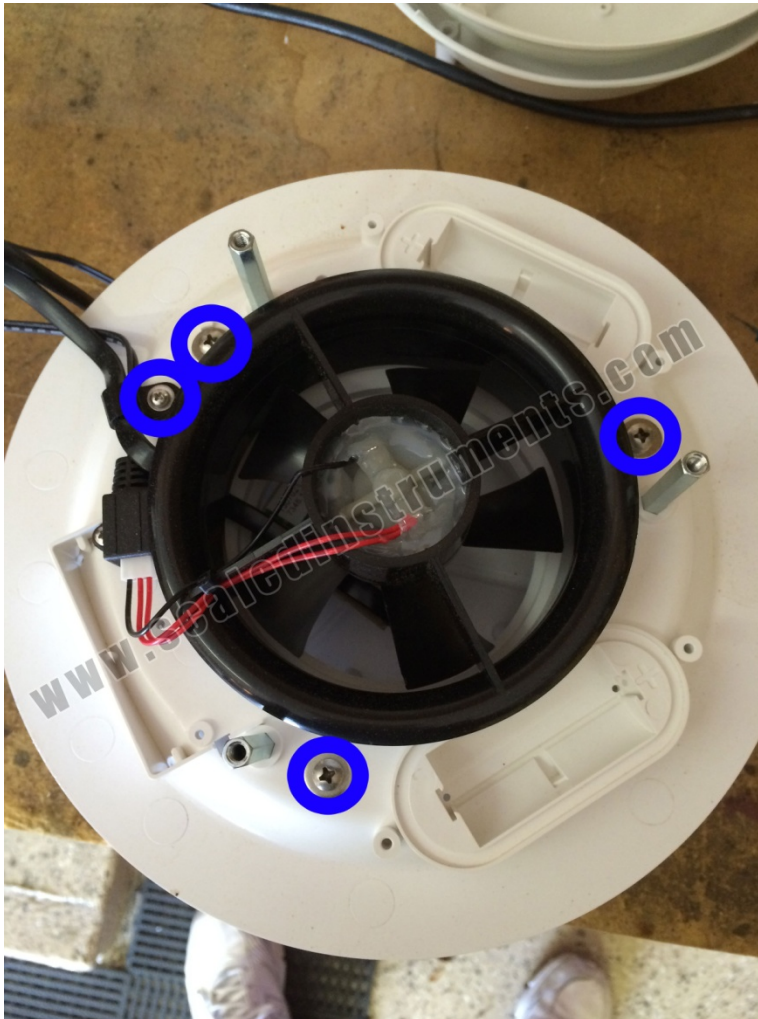
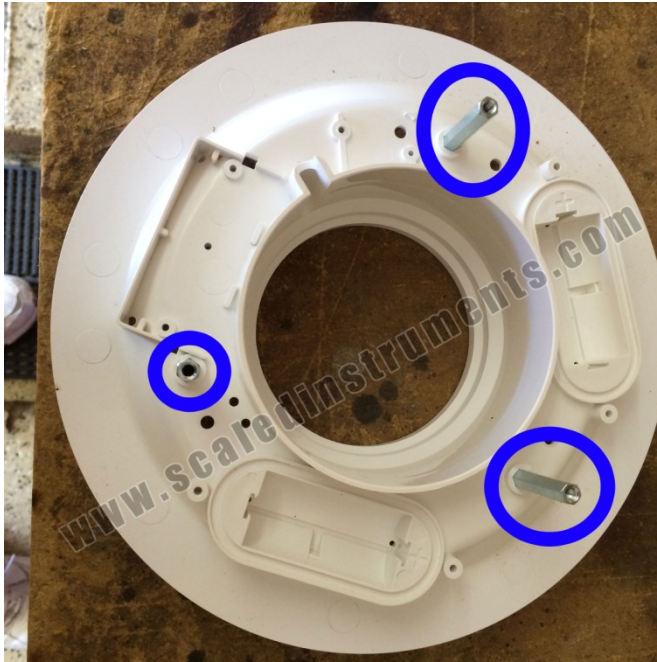


Figure 10

2. Remove the fan from the housing by simply lifting it..
3. Lift the fan plate off of the existing plate stack, and place the remaining shield to the side, being sure to keep them in the proper order.
4. Remove the existing spacers in the DFARS fan plate by removing the screw, lock washer and flat washer from the bottom of the fan plate. These screws are located under the fan plate **(Fig. 11)** Keep the spacers in a safe place, they will be needed later in Section E. Only remove the existing spacers -- the screws, lock washers and flat

washers will be used in the next step.



<- Keep these spacers for later.

Figure 11



Figure 12

5. Install the 1.5" / Hex 2.25" spacers included in the kit in the place where you removed the spacers in the previous step. Utilize the screws, lock washers, and flat washers from the previous step to secure these longer spacers to the fan plate.

Install Battery Terminals into appropriate slots

1. Take the included battery terminal wires and use the terminal side of each wire to push into the slot of each battery bay from underneath the fan plate. Push the leads through the small hole on each side of each battery bay. Remember that the red connector should be installed on the (+) side of the battery bay (labeled on the fan plate) and the black connector should be installed on the opposite side. It helps to use the handle-end of a screw driver to gently push the terminals into their slots so they are seated properly. **(Fig. 13)**



Figure 13

2. When looking down at the fan plate, you will see an empty slot where the PCBA will be installed. To the right of that, is a spacer and two small holes in the plate. Route the lead ends of the battery connectors up from the bottom of the fan plate into these holes. Route the pair of red wires through the left hole, and the pair of black wires through the

right hole. **(Fig. 14)**

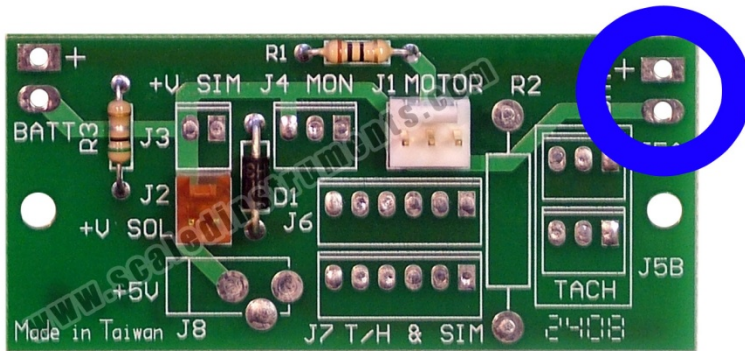


Figure 14

3. Using a wire stripper, strip appx 1/16" additional insulation from each of the leads. Twist both red leads together, and twist both black leads together.

Place the PCBA into the DFARS and Solder battery connectors

1. Temporarily secure the PCBA face-up into position where the leads can be soldered to the board. Solder the red wires to the terminal marked **BATT +** on the RIGHT side of the board (It will be necessary to flip the board over to perform the soldering). Do the same for the black leads using the solder point just below the +



2. Once soldered, the PCBA can be secured to the fan plate with (2) #4-3/8" screws as shown in Fig. 15. Push any excess wire through the two holes and make sure the wires do not interfere with the lip of where the fan will be placed.



Figure 15

3. Turn the fan plate over and use zip ties to tie up any excess wire between battery bays (**Fig. 16**)



Figure 16

4. Insert each NiCd 'C' battery into its battery bay. The flat side of the battery is the (-) side and the side with the button sticking out is the (+). It may be necessary to push the battery tabs in slightly to make the batteries fit properly. Once the batteries are installed, install the O-ring into the groove for each battery compartment (**Fig. 17**)



Figure 17

5. Install the battery covers by placing them on top of each battery. There is a notch in the middle of each cover that should face towards the fan for proper orientation. Secure each battery cover with (2) #4-3/8" self tapping screws.

Reassemble the radiation shield

1. Take the fan plate and place it back on the radiation shield plates. Route the TEMP/HUM sensor wire so that it sits flat in the groove to the left of the fan PCBA. Place the fan back in its appropriate spot, and plug its connector into the PCBA in the spot marked MOTOR. **FAN MAY SPIN AT THIS POINT.** (Note tab on connector – it can only be inserted one way). Additionally, prepare the strain relief that was removed in Section B, Step 1 so that it holds the wire for the TEMP/HUM sensor. Do not screw the strain relief down at this point, as the solar panel wire will also be included. (**Fig. 18**)



Figure 18

2. Insert the 4" screws removed earlier along with the lock-washer and flat washer to secure the fan plate to the remainder of the stack. Place the new solar panel next to the radiation shield and connect its lead to the PCBA terminal marked **SOL**. Guide the wire so it is in the strain relief. At this point, the strain relief can be screwed back to the fan plate with its #4 flat washer and self-tapping screw. Attach the PCBA cover by squeezing it and inserting it into the slots on each side of the PCBA. **(Fig. 19)**



Figure 19

3. Place the open-end plate on top of the spacers. It may require some extra effort to ensure the plate is seated at the top of the spacers. **(Fig. 20)**



Figure 20

4. Place the closed plate on top of the open-end plate. (Fig. 21)



Figure 21

5. Install the solar panel on top of the threaded spacers, being sure the solar panel itself is positioned directly over the exit point of the wires from the shield. Be sure to use the holes indicated to place the solar panel on top of the shield. (NOTE: Using the wrong set of holes will result in your solar panel being blocked by the SIM – do not use the holes indicated below with red 'X's)



6. With the solar panel in position, place a #8 flat washer and a #8 lock-washer on top of each threaded rod. Use the hex-shaped threaded spacers from included with your kit

and HAND-TIGHTEN the spacers to the solar panel until the lock-washers are flush with the top portion of the solar panel. Check each spacer twice.

7. Before re-installing the radiation shield, ensure you hear the fan spinning under battery and solar conditions. To test the battery power, bring the shield into a dark room. The fan speed should slow when running under battery power. Bring the shield into the sun so the solar panel receives bright light (a bright incandescent light can be used as well). The fan should run at a higher speed.

Reinstall the radiation shield to the ISS

1. Place the radiation shield under the bottom of the rain collector base with the solar panel facing south (if you are in the northern hemisphere).
2. Use the #8-32 x 1.25" screws included in the kit, along with the flat washers and lock washers that you removed in Section A Step 9, attach the spacers at the top of the solar panel shield to the base of the rain collector using the same holes that you removed the 3-1/4" screws from in that same step. **(Fig. 22)**



Figure 222

3. Feed the TEMP/HUM sensor wire back into the SIM using the access port on both the bottom of the solar panel and the back of the SIM.
4. Reinstall the rain collector cone by lining up the tabs with the slots and then turning the cone in a clock wise direction until it snaps into place.
5. Plug all connectors back into their respective jacks on the ISS.
6. Replace the foam insulation in the block where the access port is.
7. Reattach the connector from the top solar panel from the SIM cover included with your DFARS to the appropriate connector on the SIM. The wire from the bottom solar panel will not be connected. (NOTE: If you still have the original SIM cover with one solar panel, you may replace the dual-panel SIM cover that came with the DFARS with this.) If this is a cabled unit, this step does not apply.
8. Replace the SIM cover, being careful to ensure it is lined up with the SIM base before sliding the cover down.
9. Take the console out of Setup Mode and ensure that communication is restored.
10. Use tie-wraps to secure any loose wires after your installation is complete.

